

18. (Amended) The [A] method [of manufacturing a semiconductor device through the use of the apparatus for polishing a semiconductor substrate] according to claim [8] 14, further comprising manufacturing a semiconductor device using the semiconductor substrate.

19. (Amended) The [A] method [of manufacturing a semiconductor device comprising the method of supplying a polishing solution] according to claim [10] 15, further comprising manufacturing a semiconductor device using the semiconductor substrate.

#### **REMARKS**

Claims 1 through 19 are pending in this application. In response to the Office Action dated December 4, 2001, claims 1 through 19 have been amended and claim 20 cancelled. Care has been exercised to avoid the introduction of new matter.

A clean copy of amended claims 1 through 19 appears in the Appendix hereto.

The Examiner objected to the drawings pursuant to 37 C.F.R. §1.83(a) requiring depiction of the controller for each supply unit. The Reconsideration and withdrawal of the objection is respectfully solicited, as depiction of a controller is not necessary for a proper understanding of the claimed invention.

**Claims 1 through 20 were rejected under the second paragraph of 35 U.S.C.**

**§112.**

In the statement of the rejection, the Examiner identified various bases perceived to render the claimed invention indefinite. This rejection is traversed as legally erroneous.

Indefiniteness under the second paragraph of 35 U.S.C. §112 is a **question of law**, not form. *Personalized Media communications LLC v. U.S. International Trade Commission*, 161 F.3d 696, 48 USPQ2d 1880 (Fed. Cir. 1998); *Tillotson, Ltd v. Wlaboro Corp.*, 831 F.2d 1033, 4 USPQ2d 1450 (Fed. Cir. 1987); *Orthokinetics Inc. v. Safety Travel Chairs Inc.*, 806 F.2d 1565, 1 USPQ2d 1081 (Fed. Cir. 1986). Accordingly, in rejecting a claim under the second paragraph of 35 U.S.C. §112, the Examiner must provide a basis and fact and/or cogent technical reasoning to support the ultimate legal conclusion that one having ordinary skill in the art, with the supporting specification in hand, would not be able to reasonably ascertain the scope or protection defined by a claim. *In re Okuzawa*, 537 F.2d 545, 190 USPQ 464 (CCPA 1976). Significantly, consistent judicial precedent holds that reasonable precision in light of the particular subject matter involved is all that is required by the second paragraph of 35 U.S.C. §112. *Zoltek Corp. v. United States*, *supra*; *Miles Laboratories, Inc. v. Shandon, Inc.*, 997 F.2d 870, 27 USPQ2d 1123 (Fed. Cir. 1993); *North American Vaccine, Inc., v. American Cyanamid Co.*, 7 F.3d 1571, 28 USPA2d 1333 (Fed. Cir. 1993); *U.S. v. Telectronics Inc.*, *supra*; *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ (Fed. Cir. 1986). Applicants stress that claims must be interpreted as one having ordinary skill in the art would have interpreted the claims in light of and consistent with the supporting specification. *Zoltek Corp. v. United States*, *supra*; *Miles Laboratories, Inc. v. Shandon, Inc.*, *supra*.

In applying the above legal tenets to the exigencies of this case, Applicants submit that the Examiner did not discharge the initial burden of providing a basis in fact and/or cogent technical reasoning to support the ultimate legal conclusion that one having ordinary skill in the art would not be able to ascertain the scope of protection defined by the claims, when reasonably interpreted in light of and consistent with the supporting specification.

Indeed, the Examiner has raised the "antecedent basis" rubric, but has not really explained **why** one having ordinary skill in the art would have been **confused** as to the scope of the claims when **reasonably interpreted in light of and consistent with the written description of the specification**.

Specifically, Applicants would argue that none of claims 3, 4 and 5 is indefinite by virtue of the alternative expression recited therein. The mere use of an alternative expression does **not** render a claimed invention indefinite. *Ex parte Cordova*, 10 USPQ2d 1949 (BPAI 1987); *Ex parte Head*, 214 USPQ 551 (Bd.App. 1981). The Examiner has **not** discharged the initial burden of explaining why the alternative expression renders the claimed invention indefinite.

Further, as to claim 5, "said control unit" finds antecedent basis support in claim 3 upon which claim 5 depends.

As to the additional formalistic issues raised by the Examiner, in order to expedite prosecution, Applicants have amended the claims extensively to render explicit that which was heretofore implicit, with no intention of narrowing the scope of the claimed invention.

Applicants, therefore, submit that the imposed rejection of claims 1 through 20 under the second paragraph of 35 U.S.C. §112 is not legally viable and, hence, solicit withdrawal thereof.

**Claims 1 through 5, 8 through 12 and 14 through 20 were rejected under 35 U.S.C. §102 for lack of novelty as evidenced by Murphy et al.**

In the statement of the rejection, the Examiner reproduced drawings from Murphy et al. and referred to column 4, lines 40 through 47. This rejection is traversed as factually erroneous.

The factual determination of lack of novelty under 35 U.S.C. §102 requires the identical disclosure in a single reference of each element of a claimed invention, such that the identically claimed invention is placed into possession of one having ordinary skill in the art. *Helifix Ltd. v. Blok-Lok, Ltd.* 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994). In addition, in imposing a rejection under 35 U.S.C. §102, the Examiner is required to point to "page and line" of an applied reference identifying wherein each feature of a claimed invention is believed to be described. *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). That burden has not been discharged. Moreover, there are significant differences between the claimed invention and the apparatus and method disclosed by Murphy et al. that scotch the factual determination that Murphy et al. identically describe the claimed invention within the meaning of 35 U.S.C. §102.

Specifically, independent claims 1 and 2 require first, second and third supply units for spraying and supplying a **mist** of an abrasive slurry, additive and pure water, respectively. It is not apparent and the Examiner has not identified wherein the apparatus disclosed by Murphy et al. is capable of dispensing anything but a liquid in liquid.

Further, claim 1 and the claims dependent thereon require a mixing unit which mixes the mist of the abrasive slurry, additive and pure water to provide a polishing mixture. It is not apparent and the Examiner has not identified wherein Murphy et al. disclose any such mixing unit. A portion of a line is not a mixing unit.

The above argued differences between the claimed invention and the apparatus and methodology disclosed by Murphy et al. undermine the factual determination that Murphy et al. describe the identically claimed invention within the meaning of 35 U.S.C. §102. *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 230 USPQ 81 (Fed. Cir. 1986).

Applicants, therefore, submit that the imposed rejection of claims 1 through 5, 8 through 12 and 14 through 20 under 35 U.S.C. §102 for lack of novelty as evidenced by Murphy et al. is not factually viable and, hence, solicit withdrawal thereof.

**Claims 6, 7 and 13 were rejected under 35 U.S.C. §103 for obviousness predicated upon Murphy et al.**

This rejection is traversed.

Firstly, claims 6 and 13 depend upon claim 1, while claim 7 depends upon claim 2. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claims 1 and 2 under 35 U.S.C. §102 for lack of novelty as evidenced by Murphy et al. Specifically, Murphy et al. neither disclose nor suggest an apparatus comprising first, second and third supply units for spraying and supplying **mists** of abrasive slurry, additive and pure water, respectively. In addition, Murphy et al. neither disclose nor

suggest a mixing unit as set forth in independent claim 1. The Examiner's additional comments in stating the rejection under 35 U.S.C. §103 do not cure the argued deficiencies of Murphy et al.

In addition, as to claims 6, 7 and 13, the Examiner has failed to comply with consistent judicial precedent which require "clear and particular" factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify the apparatus and methodology of Murphy et al. to arrive at the claimed invention based upon facts -- not generalizations. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); *Ecolchem Inc. v. Southern California Edison, Co.* 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); *In re Kotzab*, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). Rather, the Examiner has resorted to generalizations.

Significantly, the Court of Appeals for the Federal Circuit has consistently held that the "obvious design choice" approach has no place in obviousness determinations under 35 U.S.C. §103. *In re Chu*, 66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995); *In re Gal*, 980 F.2d 717, 25 USPQ2d 1076 (Fed. Cir. 1992); *In re Bezombes*, 420 F.2d 1070, 164 USPQ 387 (CCPA 1970).

As to claim 13, the Examiner has done nothing more than generalize without even identifying a "desired parameter", let alone established that such a "desired parameters" an art recognized result-effective parameter. *In re Rijckaert, supra*.


Applicants, therefore, submit that the imposed rejection of claims 6, 7 and 13 under 35 U.S.C. §103 for obviousness predicated upon Murphy et al. is factually and legally erroneous and, hence, solicit withdrawal thereof.

It should, therefore, be apparent that the imposed rejections have been overcome and that this application is in clear condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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**APPENDIX**

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1. (Amended) An apparatus including a polishing solution supply system, the polishing solution supply system comprising:

A /  
a polishing table for placing a semiconductor substrate on a major surface thereof;  
a first supply unit for spraying and supplying a mist comprising abrasive slurry;  
a second supply unit for spraying and supplying a mist comprising additive;  
a third supply unit for spraying and supplying a mist comprising pure water; and  
a mixing unit for mixing the mist of abrasive slurry supplied from said first supply unit, the mist of additive supplied from said second supply unit and the mist of pure water supplied from said third supply unit to form a polishing mixture, said mixing unit supplying the polishing mixture onto said major surface of said polishing table.

2. (Amended) An apparatus including a polishing solution supply system, the polishing solution supply system comprising:

a polishing table for placing a semiconductor substrate on a major surface thereof;  
a first supply unit for spraying and supplying a mist comprising abrasive slurry to a specified location on said major surface of said polishing table;

a second supply unit for spraying and supplying a mist comprising additive onto said major surface of said polishing table so as to mix with the mist of abrasive slurry supplied from said first supply unit; and

a third supply unit for spraying and supplying a mist comprising pure water onto said major surface of said polishing table so as to mix with the mist of abrasive slurry



supplied from said first supply unit and with the mist of additive supplied from said second supply unit.

3. (Amended) The apparatus according to claim 1, wherein each of said supply units comprises:

a tank for storing liquid;

a pipe for supplying said liquid from said tank to said mixing unit;

a pump for supplying said liquid in said tank to said pipe at a pressure, or a gas supply unit for supplying a gas into said tank so as to supply said liquid in said tank to said pipe at a pressure;

a control unit for controlling the pressure of said liquid in said pipe; and

a spray unit for spraying said liquid supplied from said pipe into said mixing unit.

4. (Amended) The apparatus according to claim 2, wherein each of said supply units comprises:

a tank for storing liquid;

a pipe for supplying said liquid in said tank to said pipe at a pressure, or a gas supply unit for supplying a gas into said tank so as to supply said liquid in said tank to said pipe at a pressure;

a control unit for controlling the pressure of said liquid in said pipe; and

a spray unit for spraying said liquid supplied from said pipe onto said major surface of said polishing table.

5. (Amended) The apparatus according to claim 3, wherein said control unit includes a flow meter for measuring the flow rate of liquids in said pipe, said control unit controlling rotating speed of said pump or controlling the pressure of said gas supplied from said gas supply unit on the basis of the results of measurements by said flow meter.

6. (Amended) The apparatus according to claim 1, wherein said additive is an aqueous solution of organic acid, or an aqueous solution of hydrogen peroxide.

7. (Amended) The apparatus according to claim 2, wherein said additive is an aqueous solution of organic acid, or an aqueous solution of hydrogen peroxide.

8. (Amended) The apparatus according to claim 1, comprising a carrier head for pressing said semiconductor substrate against said major surface of said polishing table.

9. (Amended) The apparatus according to claim 2, comprising a carrier head for pressing said semiconductor substrate against said major surface of said polishing table.

10. (Amended) A method of supplying a polishing solution in an apparatus including a polishing solution supply system, the polishing solution supply system comprising:

a polishing table for placing a semiconductor substrate on a major surface thereof;  
 a first supply unit for spraying and supplying a mist comprising additive; a second supply  
 unit for spraying and supplying a mist comprising additive; a third supply unit for  
 spraying and supplying a mist comprising pure water; and a mixing unit for mixing the  
 mist of abrasive slurry supplied from said first supply unit, the mist of additive supplied  
 from said second supply unit and the mist of pure water supplied from said third supply  
 unit to form a polishing mixture, said mixing unit supplying the polishing mixture onto  
 said major surface of said polishing table, the method comprising:

spraying and supplying each of said mist comprising abrasive slurry, said mist  
 comprising additive and said mist comprising pure water into said mixing unit, and  
 mixing them in said mixing unit to form a polishing mixture; and

supplying the polishing mixture onto said major surface of said polishing table.

11. (Amended) A method of supplying a polishing solution in an apparatus  
 including a polishing solution supply system, the polishing solution supply system,  
 comprising:

a polishing table for placing a semiconductor substrate on a major surface thereof;  
 a first supply unit for spraying and supplying a mist comprising abrasive slurry to a  
 specified location on said major surface of said polishing table;

a second supply unit for spraying and supplying a mist comprising additive onto  
 said major surface of said polishing table so as to mix with the mist of abrasive slurry  
 supplied from said first supply unit; and

a third supply unit for spraying and supplying a mist comprising pure water onto said major surface of said polishing table so as to mix with the mist of abrasive slurry supplied from said first supply unit and with the mist of additive supplied from said second supply, the method comprising spraying and supplying each of said mist comprising abrasive slurry, said mist comprising additive and said mist comprising pure water onto said major surface of said polishing table so as to mix with each other.

12. (Amended) The method of supplying a polishing solution according to claim 10, further comprising:

measuring a quantity of each of said abrasive slurry, additive and pure water; and

controlling a supply pressure of each of said abrasive slurry, said additive and said pure water to a desired value on the basis of the results of measurement.

13. (Amended) The method of supplying a polishing solution according to claim 10, further comprising supplying pure water to said mixing unit, when said abrasive slurry is not supplied to said mixing unit for a specified period of time.

14. (Amended) A method of polishing a semiconductor substrate in an apparatus including a polishing solution supply system, the polishing solution supply system comprising:

a polishing table for placing a semiconductor substrate on a major surface thereof; a first supply unit for spraying and supplying a mist comprising slurry; a second supply unit for spraying and supplying a mist comprising additive; a third supply unit for

spraying and supplying a mist comprising pure water; and a mixing unit for mixing the mist of abrasive slurry supplied from said first supply unit, the mist of additive supplied from said second supply unit and the mist of pure water supplied from said third supply unit to form a polishing mixture, said mixing unit supplying the polishing mixture onto said major surface of said polishing table; and a carrier head for pressing said semiconductor substrate against said major surface of said polishing table, while pressing the semiconductor substrate against said polishing table using said carrier head, the method comprising:

spraying and supplying each of said abrasive slurry, said additive, and said pure water into said mixing unit, and mixing them in said mixing unit; and  
supplying the mixture onto said major surface of said polishing table.

15. (Amended) A method of polishing a semiconductor substrate in an apparatus including a polishing solution supply system, the polishing solution supply system comprising: a polishing table for placing a semiconductor substrate on a major surface thereof; a first supply unit for spraying and supplying a mist comprising abrasive slurry to a specified location on said major surface of said polishing table; a second supply unit for spraying and supplying a mist comprising additive onto said major surface of said polishing table so as to mix with the mist of abrasive slurry supplied from said first supply unit; and a third supply unit for spraying and supplying a mist comprising pure water onto said major surface of said polishing table so as to mix with the mist of abrasive slurry supplied from said first supply unit and with the mist of additive supplied from said second supply unit; and a carrier head for pressing said semiconductor

substrate against said major surface of said polishing table, while pressing the semiconductor substrate against said polishing table using said carrier head, the method comprising, spraying and supplying each of said abrasive slurry, said additive, and said pure water onto said major surface of said polishing table so as to mix with each other.

16. (Amended) The method according to claim 10, comprising supplying the polishing solution during manufacturing a semiconductor device.

17. (Amended) The method according to claim 11, comprising spraying and supplying said mist comprising abrasive slurry, said mist comprising additive and said mist comprising pure water during manufacturing a semiconductor device.

18. (Amended) The method according to claim 14, further comprising manufacturing a semiconductor device using the semiconductor substrate.

19. (Amended) The method according to claim 15, further comprising manufacturing a semiconductor device using the semiconductor substrate.

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